

BIPOLAR TRANSISTOR SELF-ALIGNMENT WITH RAISED EXTRINSIC BASE EXTENSION AND METHODS OF FORMING SAME

Abstract

A self-aligned bipolar transistor structure having a raised extrinsic base comprising an outer region and an inner region of different doping concentrations and methods of fabricating the transistor are disclosed. More specifically, the self-alignment of the extrinsic base to the emitter is accomplished by forming the extrinsic base in two regions. First, a first material of silicon or polysilicon having a first doping concentration is provided to form an outer extrinsic base region. Then a first opening is formed in the first material layer by lithography within which a dummy emitter pedestal is formed, which results in forming a trench between the sidewall of the first opening and the dummy pedestal. A second material of a second doping concentration is then provided inside the trench forming a distinct inner extrinsic base extension region to self-align the raised extrinsic base edge to the dummy pedestal edge. Since the emitter is formed where the dummy pedestal existed, the extrinsic base is also self-aligned to the emitter. The

silicon or polysilicon forming the inner extrinsic base extension region can also be grown in the trench with selective or non-selective epitaxy.